

Slope-Intercept FormRewrite each linear equation in slope-intercept form. $y = mx + b$

1. $4x - 8y = 24$

Get y
alone!

$$4x - 8y = 24$$

$$-8y = \frac{24 - 4x}{-8}$$

$$y = 3 + \frac{1}{2}x \text{ or } y = 3 + \frac{x}{2}$$

2. $9x = 3y - 18$

$$9x = 3y - 18$$

$$\frac{9x + 18}{3} = \frac{3y}{3}$$

$$3x + 6 = y \text{ or } y = 3x + 6$$

3. $7x - 7y + 21 = 0$

$$7x - 7y + 21 = 0$$

$$\frac{7x + 21}{7} = \frac{7y}{7}$$

$$x + 3 = y \text{ or } y = x + 3$$

Break-Even PointFill in the blank with $>$, $<$, or $=$.

4. Before a new business reaches its break-even point, its costs are _____ $>$ _____ its income.
5. Once a business is profitable, its costs are _____ $<$ _____ its income.
6. At the break-even point, a business's costs _____ $=$ _____ its income.

Solve the following by graphing.

7. Eric sells model cars at a local flea market. He purchases each model car from a distributor for \$10, and the flea market charges him a booth fee of \$50. Eric sells each model car for \$20.

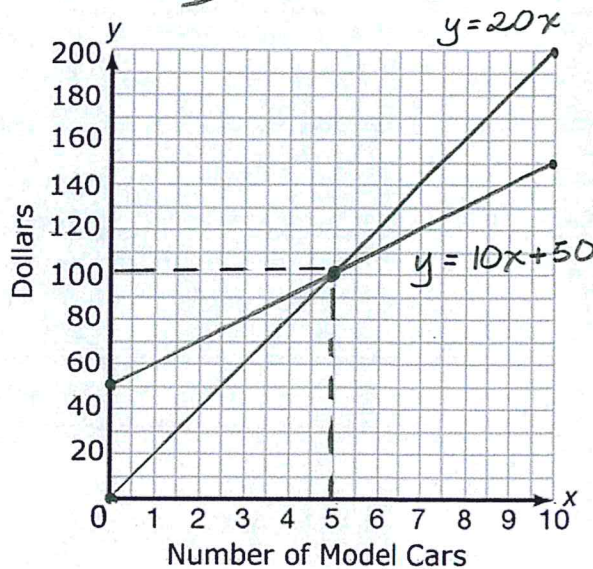
Income equation: $y = 20x$

Cost/Expense equation: $y = 10x + 50$

Break-even Point: $(5, 100)$

Describe the solution in terms of the problem situation. Fill in the blank.

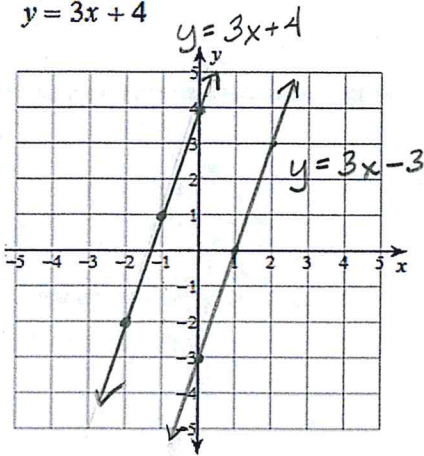
Eric needs to sell 5 model cars to break-even so his cost/income will be \$ 100.



Graphing

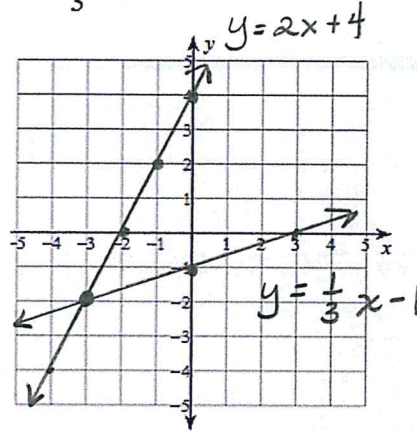
Solve each system of equations by graphing. Specify whether there is no solution, infinite solutions, or write the ordered pair (x, y) if there is one solution.

8. $y = 3x - 3$
 $y = 3x + 4$



Solution: No solution

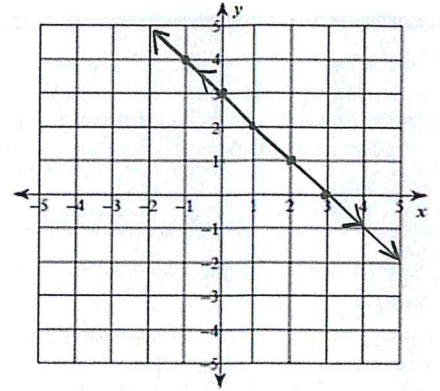
9. $y = 2x + 4$
 $y = \frac{1}{3}x - 1$



Solution: $(-3, -2)$

10.

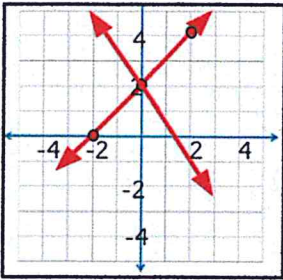
$-x + 3 = y \rightarrow y = -x + 3$
 $-3 + y + x = 0 \rightarrow y = -x + 3$



Solution: Infinite solutions

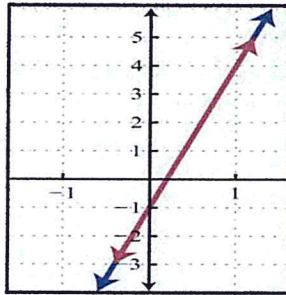
Label each system of equations as one solution, no solution, or infinite solutions. Then, label each system as consistent or inconsistent.

11.



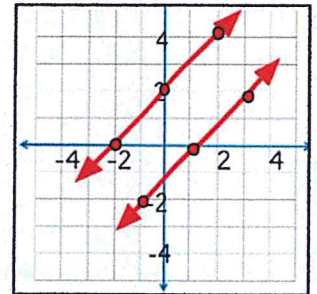
one solution
consistent

12.



infinite solutions
consistent

13.



no solution
inconsistent

Substitution

14. Workout Plus offers a membership for \$30 each month plus a \$100 start-up fee. Fit Works offers a membership for \$50 each month plus a \$20 start-up fee. Write a system of linear equations to represent each workout facility. Then, use **substitution** to determine when the memberships to both gyms cost the same amount.

$$\text{Workout Plus: } y = 30x + 100$$

$$\text{Fit Works: } y = 50x + 20$$

$$\begin{array}{r} 30x + 100 = 50x + 20 \\ -30x \qquad \qquad -30x \\ \hline 100 = 20x + 20 \\ -20 \qquad \qquad -20 \\ \hline 80 = 20x \\ \underline{20} \quad \underline{20} \\ 4 = x \end{array}$$

$$y = 30(4) + 100$$

$$y = 120 + 100$$

$$y = 220$$

Solution:

Describe the solution in terms of the problem situation. Fill in the blanks.

After 4 months, the memberships to both gyms will cost the same amount of money. Each of membership will cost \$ 220.

15. Bob has to decide which cell phone plan to use. AT&T charges \$30 plus \$0.10 per minute of data usage. Verizon costs \$45 plus \$0.08 for every minute of data. Write a system of linear equations to represent each cell phone plan. Then, use **substitution** to determine when both cell phone plans will charge the same amount.

$$\text{AT\&T: } y = 0.10x + 30$$

$$\text{Verizon: } y = 0.08x + 45$$

$$\begin{array}{r} 0.10x + 30 = 0.08x + 45 \\ -30 \qquad \qquad -30 \\ \hline 0.10x = 0.08x + 15 \\ -0.08x \quad -0.08x \\ \hline 0.02x = 15 \\ \underline{0.02} \quad \underline{0.02} \\ x = 750 \end{array}$$

Solution:

$$y = 0.10(750) + 30$$

$$y = 105$$

Describe the solution in terms of the problem situation. Fill in the blanks.

Each Both cell phone plans will cost \$ 105 each after 750 ^{minutes} ~~months~~.

Solve each system using substitution. If needed, rewrite equations in integer form first.

16. $-2x + 8y = 4$
 $y = 2$

$$\begin{aligned} -2x + 8(2) &= 4 \\ -2x + 16 &= 4 \\ \underline{-16} \quad \underline{-16} & \\ -2x &= -12 \\ \underline{-2} \quad \underline{-2} & \\ x &= 6 \end{aligned}$$

$(6, 2)$

19. $y = -3x - 16$
 $-3x - y = 16$

$$\begin{aligned} -3x - (-3x - 16) &= 16 \\ -3x + 3x + 16 &= 16 \\ 16 &= 16 \end{aligned}$$

Infinite solutions

17. $y = -7x - 7$
 $y = -6x - 5$

$$\begin{aligned} -7x - 7 &= -6x - 5 \\ \underline{+6x} \quad \underline{+6x} & \\ -x - 7 &= -5 \\ \underline{+7} \quad \underline{+7} & \\ -x &= 2 \\ \underline{-1} \quad \underline{-1} & \\ x &= -2 \end{aligned}$$

$$\begin{aligned} y &= -7(-2) - 7 \\ y &= 14 - 7 \\ y &= 7 \end{aligned}$$

$(-2, 7)$

20. $5x + y = 1 \rightarrow y = 1 - 5x$
 $15x + 3y = -7$

$$\begin{aligned} 15x + 3(1 - 5x) &= -7 \\ 15x + 3 - 15x &= -7 \\ 3 &\neq -7 \end{aligned}$$

No solution

18. $-0.5x + 0.3y = -0.7 \times 10$
 $0.1y = 0.6x + 0.2 \times 10$

$$\begin{aligned} -5x + 3y &= -7 \\ y &= 6x + 2 \end{aligned}$$

$$\begin{aligned} -5x + 3(6x + 2) &= -7 \\ -5x + 18x + 6 &= -7 \\ 13x + 6 &= -7 \\ \underline{-6} \quad \underline{-6} & \\ 13x &= -13 \\ \underline{13} \quad \underline{13} & \\ x &= -1 \end{aligned}$$

$$\begin{aligned} y &= 6(-1) + 2 \\ y &= -6 + 2 = -4 \\ \frac{1}{2}x + \frac{3}{2}y &= 5 \quad (-1, -4) \\ \underline{\times 2} & \end{aligned}$$

21. $\frac{1}{3}y = 2x - 1 \times 3$
 $x + 3y = 10$

$$\begin{aligned} y &= 6x - 3 \\ x + 3(6x - 3) &= 10 \\ x + 18x - 9 &= 10 \\ 19x - 9 &= 10 \\ \underline{+9} \quad \underline{+9} & \\ 19x &= 19 \\ \underline{19} \quad \underline{19} & \\ x &= 1 \end{aligned}$$

$$\begin{aligned} y &= 6(1) - 3 \\ y &= 6 - 3 \\ y &= 3 \end{aligned}$$

$(1, 3)$